STATE OF MAINE

GOVERNOR'S ENERGY OFFICE

RESPONSE COVER PAGE

RFI#201608160

DEPLOYMENT OF QUEBEC-MAINE ELECTRIC VEHICLE CHARGING CORRIDOR

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ORGANIZATION

Energetics Incorporated (Energetics) is a full-service technology and management consulting firm serving public- and private-sector clients. Since the company's founding in 1979, Energetics has worked to develop and manage effective research, development, and information programs in the fields of energy, manufacturing, climate and environment, infrastructure protection, and global health. Energetics is a wholly-owned subsidiary of VSE Corporation, a $650 million (annually) government services firm with offices and employees around the world. Energetics is headquartered in Columbia, Maryland, and maintains offices in Clinton, NY, Washington, DC, Bellingham, WA, and Dubai, United Arab Emirates.

Energetics has more than 35 years of experience in energy-related fields, assisting government and industry in developing new solutions to energy problems. Staff members have supported the U.S. Department of Energy (DOE) and the DOE national laboratory system since the founding of the company. Energetics currently provides programmatic and technical assistance to the DOE Vehicle Technologies Office, as well as the transportation research and deployment efforts at the Oak Ridge National Laboratory, National Renewable Energy Laboratory, Argonne National Laboratory, and the Idaho National Laboratory. Energetics' staff members have worked closely with state energy offices, including the New York State Energy Research and Development Authority (NYSERDA) and Colorado Energy Office, local governments, and private clients to investigate and help expand the use of advanced energy technologies. Key programs and initiatives supported by Energetics include:

- DOE Clean Cities
- DOE 21st Century Truck Partnership
- NYSERDA Electric Vehicle Charging Station Deployment Program

Energetics employs more than 90 environmental scientists, engineers in all key disciplines, economists, political scientists, and a comprehensive editorial and graphic design staff. The Energetics Sustainable Transportation Solutions division includes 22 engineers and scientists with extensive experience in fuel efficiency, alternative fuels, and advanced drivetrain technologies. Energetics staff members have played key roles in successfully demonstrating and evaluating several advanced transportation technologies, including:

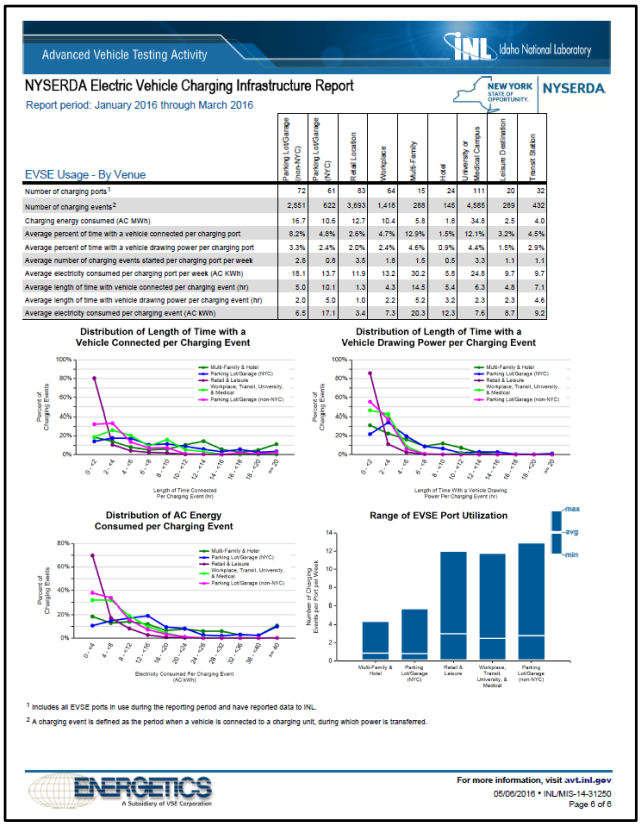
- EV charging infrastructure
- Battery electric vehicles (EVs) for use in a car sharing operation
- Truck stop electrification for long-haul trucks
- Electric trailer refrigeration units for long-haul and regional trucks
- Electric propulsion for marine vessels
- Hydraulic hybrid propulsion for Class 8 refuse trucks
- Idle reduction systems for work trucks and short-line locomotives

Energetics has both prior and active projects with a number of public and private organizations to analyze their fleets using historical mileage and fuel logs, and in some cases data loggers, to determine if alternative fuels or advanced transportation technologies (including electric vehicles) are beneficial economically and from an environmental perspective. Fleet assessments have been conducted for the following clients: United States Postal Service, United States Fish and Wildlife Service, New York State Department of Transportation Region 4 (Greater Rochester), City of Raleigh (North Carolina), City of Red Deer (Alberta, Canada), City of College Station (Texas), and City of Des Plaines (Illinois).

RELEVANT PROJECTS AND QUALIFICATIONS PERTINENT TO THE SPECIFIC WORK DESCRIBED IN THE RFI

ELECTRIC VEHICLE SUPPLY EQUIPMENT SUPPORT

Energetics was selected by NYSERDA to oversee the electric vehicle support equipment (EVSE) Deployment Program in New York State. Energetics verifies EVSE installation and operation for all installed EVSE in this program (more than 20 projects with a total more than 700 charging ports). Energetics is developing reports and conducting analyses based on existing EV and EVSE information to assist New York State in addressing potential EV and EVSE deployment issues or barriers. Energetics prepares quarterly EVSE utilization and operation reports, along with yearly program summaries which draw conclusions on EV and EVSE use and posts them on NYSERDA's ChargeNY website. Our analysis has found that Urban-based EV charging stations are occupied more often than those in suburban or rural locations. EV charging stations in New York City (NYC) parking garages, multi-family dwellings, and hotels averaged few charge events per day, but dispensed the highest amounts of energy per charge event. EV charging stations that charged a fee for use (most are NYC parking garages) followed this same trend: few charge events per day, but high energy dispensed per charge event. The average plug-in time per charge event differed for various location types. Shortest, by far, were the retail locations, but this venue also experienced the highest average number of charging events per day. Multi-family dwellings and NYC parking garages showed the longest plug-in times per charge event. University or Medical Campuses had the highest overall utilization when accounting for the number of charge events and connection time per charge event.



Advanced Vehicle Testing Activity — Idaho National Laboratory

NYSERDA Electric Vehicle Charging Infrastructure Report

Report period: January 2016 through March 2016

NEW YORK STATE OF OPPORTUNITY. NYSERDA

EVSE Usage - By Venue

	Parking Lot/Garage (non-NYC)	Parking Lot/Garage (NYC)	Retail Location	Workplace	Multi-Family	Hotel	University or Medical Campus	Leisure Destination	Transit Station
Number of charging ports[1]	72	61	83	64	16	24	111	20	32
Number of charging events[2]	2,551	622	3,693	1,416	286	145	4,586	289	432
Charging energy consumed (AC MWh)	16.7	10.6	12.7	10.4	5.6	1.8	34.8	2.5	4.0
Average percent of time with a vehicle connected per charging port	8.2%	4.8%	2.6%	4.7%	12.9%	1.5%	12.1%	3.2%	4.5%
Average percent of time with a vehicle drawing power per charging port	3.3%	2.4%	2.0%	2.4%	4.6%	0.9%	4.4%	1.5%	2.9%
Average number of charging events started per charging port per week	2.8	0.8	3.5	1.8	1.5	0.5	3.3	1.1	1.1
Average electricity consumed per charging port per week (AC KWh)	18.1	13.7	11.9	13.2	30.2	5.8	24.9	9.7	9.7
Average length of time with vehicle connected per charging event (hr)	5.0	10.1	1.3	4.3	14.5	5.4	5.3	4.8	7.1
Average length of time with vehicle drawing power per charging event (hr)	2.0	5.0	1.0	2.2	5.2	3.2	2.3	2.3	4.6
Average electricity consumed per charging event (AC KWh)	6.5	17.1	3.4	7.3	20.3	12.3	7.6	8.7	9.2

Distribution of Length of Time with a Vehicle Connected per Charging Event

Distribution of Length of Time with a Vehicle Drawing Power per Charging Event

Distribution of AC Energy Consumed per Charging Event

Range of EVSE Port Utilization

[1] Includes all EVSE ports in use during the reporting period and have reported data to INL.

[2] A charging event is defined as the period when a vehicle is connected to a charging unit, during which power is transferred.

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For more information, visit avt.inl.gov

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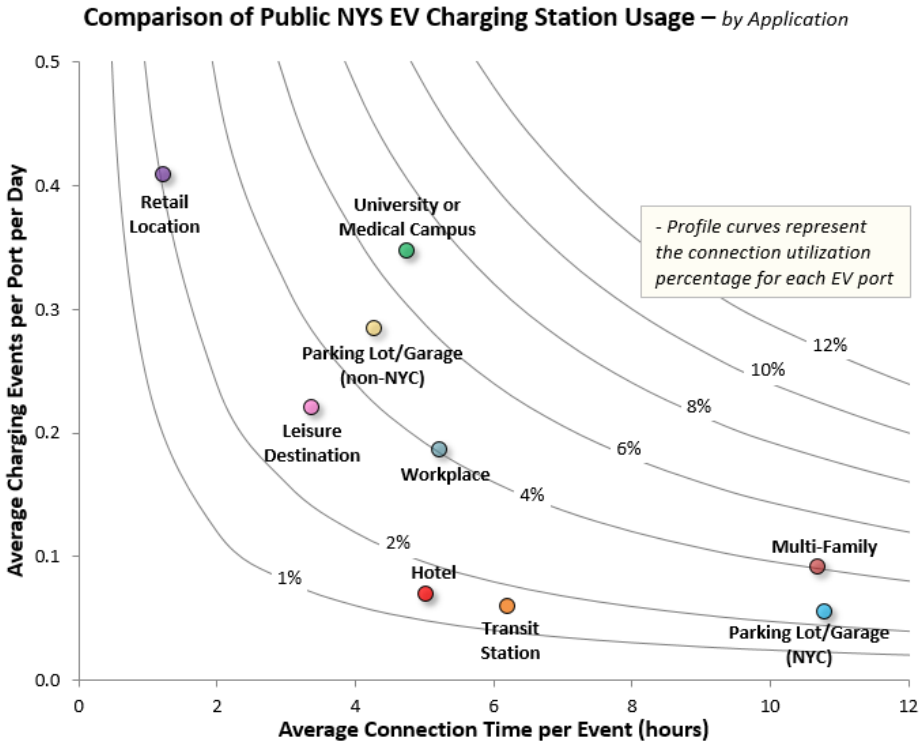
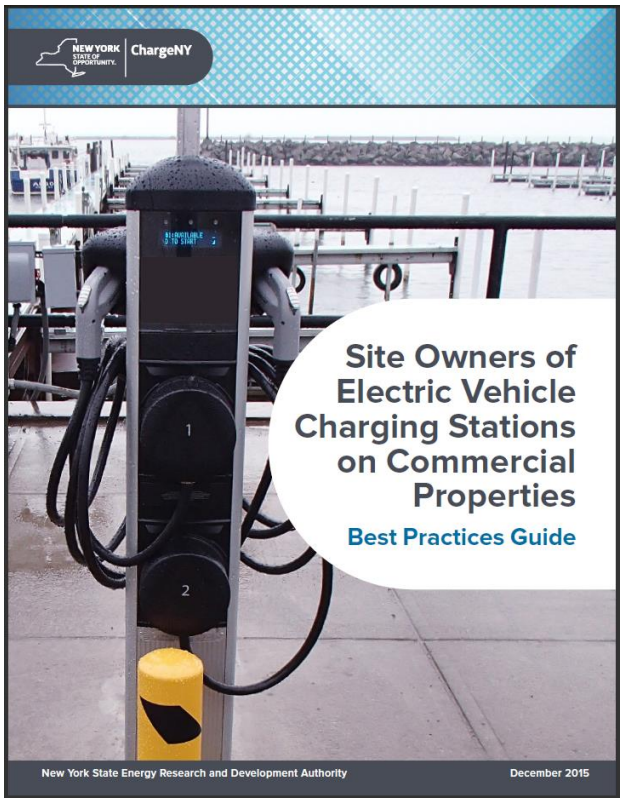


In support of the Northeast Electric Vehicle Network, Energetics completed an assessment that provided a region-wide look at EV and EVSE deployment, highlighting trends in EV ownership and EVSE locations while offering recommendations to maximize the impact of EVSE installation. Other documents included Charging Station Cluster Analysis, Siting and Design Guidelines for Charging Stations, EV-Ready Codes for the Built Environment, Planning Policy Tool Guide, Charging Station Signage Overview, EVSE Permit Process Streamlining, EV Charging Station Installers Best Practices Guide, Workplace Charging Guide, and Best Practices Guide for Site Owners of EV Charging Stations on Commercial Properties. A comprehensive set of technology transfer activities, including a website and informative brochures, was developed to reach key stakeholders with targeted messages about the benefits of EVs for New York State.



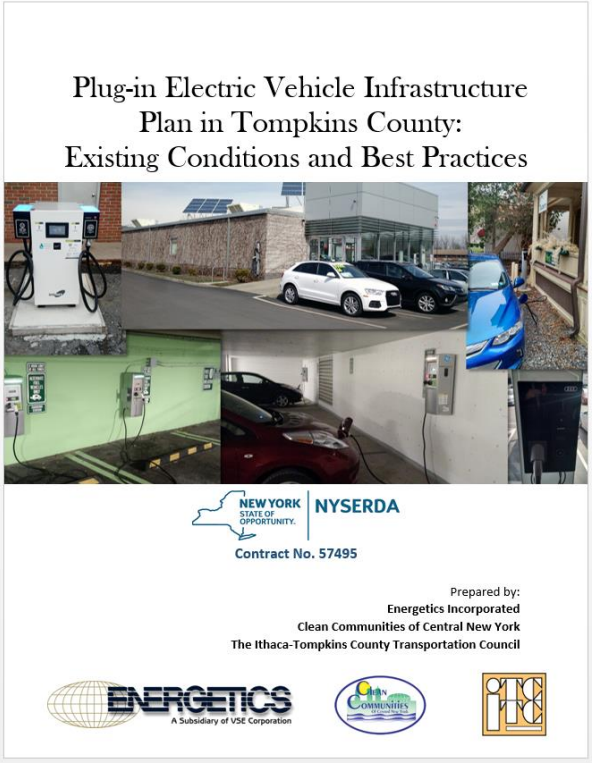
Project Reference: Adam Ruder, NYSERDA, Transportation Program Manager, 518-862-1090 x3411, adam.ruder@nyserda.ny.gov.

EV CHARGING STATION PLANS FOR THE NEW YORK I-90 CORRIDOR

Energetics led a project to **develop five regional EV charging station plans in upstate New York** along the I-90 corridor. These plans identified gaps where public EV charging stations are not available to support EV drivers and suggest further EV infrastructure deployments in key locations to establish a comprehensive charging network. Staff helped address any implementation barriers and work with municipalities to encourage and prepare for public EV charging station installations. The EV Charging Station Plans assess the region's current EV-readiness (including local government engagement, number and type of publicly accessible EV charging stations, number of EVs, utility programs, local EV supporters, and other incentives), identify areas that lack EV infrastructure (places where there are no Level 2 charging stations within 20-40 miles, meaning an EV driver passing through the area would not have a feasible option to charge if needed), and make recommendations to establish a comprehensive network of EV charging stations to support current and future EV drivers. The resulting proposed new EV charging station locations create a comprehensive network of Level 2 public EV charging stations, low-powered DC fast chargers (~20-24 kW), and high-powered DC fast chargers (~50 kW) to support EV drivers. The plans describe networks that support both intra-regional and inter-regional travel in upstate New York.

Project Reference: Colleen Smith-Lemmon, NYSDOT, Statewide Planning Bureau, 518-457-6201, Colleen.Smith-Lemmon@dot.ny.gov.

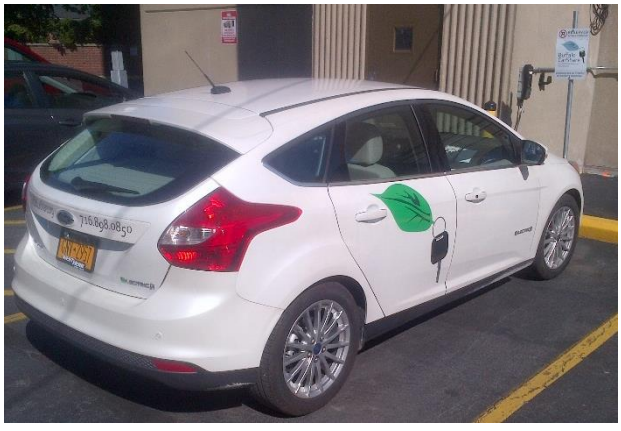
ELECTRIC VEHICLE INFRASTRUCTURE PLAN IN TOMPKINS COUNTY



Energetics is developing an EV Infrastructure Plan for Tompkins County in collaboration with the Ithaca-Tompkins County Transportation Council and Clean Communities of Central New York. There are currently five locations in Tompkins County that offer public charging, along with several dealerships and a few private sites. More public EV charging station infrastructure will be necessary to make EVs a practical choice for drivers. Staff completed an existing conditions and best practices report addressing EV infrastructure in Tompkins County. Energetics has also developed an EV charging station criteria tool to assist in identifying suitable locations for the installation of EV charging stations. This tool provides local public and private officials with guidance and best practices for evaluating EV charging station options addressing questions of location, access, costs and suitability of charging station technologies. Staff is currently in the process of developing an EV Charging Station Suitability Report that will identify a set of optimal locations for EV charging stations in Tompkins County. That will be followed by preliminary engineering and cost analysis for five optimal sites for new EV charging stations. The final deliverable is an overall EV Infrastructure Plan that includes implementation strategies and specific actions for expanding the EV charging station network in Tompkins County.

BUFFALO CARSHARE ELECTRIC VEHICLE DEMONSTRATION

Energetics oversaw the deployment of four Ford Focus EVs in the Buffalo CarShare (BCS) fleet to evaluate the performance and suitability of this technology in a car sharing operation. Sponsored by NYSERDA, this project tested EVs in a car sharing environment, gathered a broad range of information on the operational characteristics of EVs in real-world conditions as used by a multitude of drivers, and increased awareness of EVs throughout Buffalo. The EVs met the car sharing member needs for many of their trips, especially during warm weather. BCS members were very satisfied with the EV's performance and many chose the EVs afterwards because of the superior driving experience. Unfortunately, the EVs did not have a positive return on investment for BCS due to low usage (only used 53% as much as conventional vehicle). The EV's limited range during cold temperatures and need to charge at base for a couple of hours before the next use negatively impacted the economic viability of this concept; however, car sharing operations are a good opportunity to understand the functionality and durability of advanced vehicle technologies in real-world operation for a broad driver audience. This project also provided useful insight into EV operations in a New York State based fleet and gave many drivers a chance to drive an EV for the first time, significantly increasing the EV awareness and acceptance.



EV TOURISM STUDY FOR THE LOWER HUDSON VALLEY

Energetics supported a study to examine the feasibility, business modeling, and potential environmental impacts for EV-based tourism in the Hudson Valley and Catskills regions of lower New York State. The project engaged three principal stakeholder groups: Metro-North Railroad; car sharing and car rental services; and businesses in the hospitality sector intrigued by the emergent eco-traveler market and interested in attracting EV early adopters and aspirational early adopters to their locations. The study drew support from an Advisory Committee composed of both primary and secondary stakeholders, including the New York Power Authority, the Dutchess County Regional Chamber of Commerce, the Sullivan County Visitors Association, and Hospitality Green, a sustainability consulting firm serving the tourism industry in the area. The study team identified the commuter rail hubs as key access points to this region and mapped routes aimed at optimizing potential EVSE availability and instilling driver "range confidence." Two possible EV tour packages aimed at both day-trip and the weekend getaway market were developed in addition to a business and operational model aimed at optimizing the EV driver experience while hedging the financial risk for the EV operators.

DOE CLEAN CITIES TECHNICAL SUPPORT

Energetics has provided technical and outreach assistance to the DOE Clean Cities Program for 20 years and has developed numerous information products such as a comprehensive training video for EVSE installers and numerous alternative fuel vehicle case studies. Energetics developed and produced a video titled "*Electric Vehicle Supply Equipment Residential Home Charging Installation*," which is a 30-minute overview of the EVSE installation process geared toward electrical contractors and inspectors. The video addresses the safety, technical, and consumer issues that contractors and inspectors should understand before installing EVSE in residential applications. The video also provides an introduction to various types of EVSE, with experts demonstrating their use. The video provides an excellent introduction to residential EVSE and its installation requirements. Energetics also assisted in the development of a comprehensive set of questions for an electric vehicle community readiness scorecard. A series of questions and possible responses about electric vehicle infrastructure, codes and standards, vehicle deployment, and other aspects of community readiness were developed. These questions were incorporated into a web-based survey tool that is being used by the Clean Cities Program to assess community readiness for EVs.

Additional Active and Ongoing Projects

Energetics has several projects currently funded or awarded by NYSERDA to support the ChargeNY initiative and promote expanded EV use in New York. These include:

- Implementing and evaluating EV sales strategies at a multi-brand dealership which include; providing extended test drives, training sales staff, having one area where multiple EV models from different manufacturers are displayed, providing EV charging infrastructure information, and analyzing the cost of PEV ownership based on a customer's driving requirements.
- Developing a guidance document for planners and planning board members to better support EV charging station deployment in their jurisdiction. Staff will also serve as a resource for planners and planning boards to inform and educate them on PEVs and charging stations, while attempting to enhance their opportunity to influence PEV-readiness.
- Engaging workplaces throughout New York State to educate and encourage them to install workplace charging for their employees which will support increased adoption of EVs. The project will introduce the concept of workplace charging to numerous businesses, then target specific businesses that express interest in workplace charging to provide installation planning support and educate their employees on PEV technology and options.

- Leading an EV Market Development program that will use innovative solutions to stimulate and expand the market for EV purchases in New York State. It includes a multiple-pronged approach of installing charging station infrastructure and conducting outreach. Charging stations will be deployed to carry out the recommendations in the I-90 EV Charging Plans, EV deployment communities will demonstrate marketing strategies that support and promote this technology, and an EV tourism campaign will demonstrate the potential benefits of catering to EV drivers.
- Developing low-cost EV charging infrastructure installation and operation approaches that will be applicable to venues where EVs typically are parked longer than needed to fully charge the battery (e.g., workplace, airport, rideshare, and multi-family unit parking).

KEY STAFF

Bryan Roy has a mechanical engineering BS (2000) and MS (2005) degrees from Union College and North Carolina State University, respectively. He is a Transportation Commercial Team Lead for Energetics and a certified Project Management Professional. Mr. Roy has 10 years of research and engineering experience with advanced transportation technologies. He has led and contributed to several technical and feasibility assessments, technology demonstrations, and outreach projects encompassing advanced propulsion solutions such as electrification, hybrids, energy efficiency, and compressed natural gas. Mr. Roy currently leads the effort to collect information on the NYSERDA-funded EVSE demonstration installations throughout NYS. Through site visits, he documents the factors that may have an impact on how the EVSE is utilized including signage, location on the property, and knowledge of the hosts. Mr. Roy is also gathering installation costs and analyzing the factors that influence these in various settings. He authored a white paper summarizing EV- and EVSE-related initiatives from Public Utility Commissions nationwide highlighting potential barriers for deployment of this technology. Mr. Roy developed the EV charging station site suitability tool for Tompkins County that will be used to evaluate potential sites for expanding charging infrastructure. Over the past 7 years, Mr. Roy has led or participated in more than a dozen NYSERDA sponsored projects, most recently to demonstrate the benefits of EVs in a car-sharing service, investigated electric charging for medium duty trucks, and evaluating locations for EVSE in an EV Tourism concept.

Ziga Ivanic, Energetics' Transportation Program Director, is a registered Professional Engineer and a certified Project Management Professional with 10 years of project and 5 years of program management experience. Mr. Ivanic has a mechanical engineering BS (2002) and MS (2004) degrees from Norwich University and Massachusetts Institute of Technology, respectively. He has more than 11 years of experience providing technical and analytical services to various federal, state, and private clients in the areas of advanced transportation technologies, conventional and alternative fuels, transportation electrification and greenhouse gas analysis. His expertise includes technology assessments, market analysis, transportation planning, demonstrations, remote data acquisition, and vehicle performance and emissions testing. He is currently providing technical support to the DOE Vehicle Technologies Office (VTO) and managing Energetics' support of the NYSERDA-sponsored EVSE Deployment Project. Mr. Ivanic also serves as a technical advisor to the electric drive technologies research and development area in support of the DOE VTO EV Everywhere Grand Challenge, which has a goal to make EVs affordable for the average consumer by 2022. In this capacity, he led a technical and market assessment of plug-in EV charging technology by conducting interviews with OEMs and suppliers to gather information on the status, costs, and future research and development needs. Mr. Ivanic also oversees Energetics' fleet assessments projects focusing on alternative fuels and advanced transportation technologies.

Paul Windover, Energetics' Associate Engineer, has a Bachelor of Mechanical Engineering Technology from State University of New York Institute of Technology. He has 5 years of experience with advanced transportation projects including fleet assessments, vehicle data acquisition and duty cycle analysis, and technology evaluation and deployment. Mr. Windover's responsibilities for these efforts include data collection, quality control, post processing, and analysis, system modeling and concept development, technology evaluation, and market analysis. His recent efforts have been focused on a number of fleet studies for various organizations and municipalities throughout the U.S. and Canada. Under these projects, he is responsible for organizing, processing, and evaluating the fleet vehicle data provided by the various departments. Mr. Windover has conducted many of the EV charging station site verifications for NYSERDA's EVSE Deployment Program and regularly analyzes vehicle registration data from the Department of Motor Vehicle to determine the growth of EVs in New York State. Mr. Windover is thoroughly familiar with automotive power train, suspension, charging and electrical/electronic systems.

Michael Laughlin has more than 15 years of experience in transportation energy and emissions activities, including alternative fuel vehicle and infrastructure analysis and advanced technology vehicle analysis. He has managed projects and tasks for the U.S. DOE, the Oak Ridge National Laboratory, the National Renewable Energy Laboratory, the Maryland Energy Administration, and the Delaware State Energy Office. Mr. Laughlin served as Task Leader for the DOE Vehicle Technologies Program, being responsible for financial and staff management for this $3 million per year task and serving as a technical expert. He has managed the information dissemination and technical analysis activities for the DOE 21st Century Truck Partnership (comprised of fifteen industry members and four Federal agencies in the heavy truck arena focused on reducing fuel use and emissions from heavy duty vehicles through engine efficiency, truck design, and idle reduction technologies) for the Oak Ridge National Laboratory. Mr. Laughlin has also provided technical and outreach assistance in the DOE Clean Cities Program (dedicated to reducing petroleum use through voluntary local initiatives in alternative fuels, idle reduction, fuel economy, and advanced technology vehicles), developing information products such as the Alternative Fuel Price Report and informational fact sheets on alternative fuel school buses that are posted on the DOE Alternative Fuel Data Center and the Clean Cities website.

Michael Lloyd has more than 10 years of engineering consulting and research experience in advanced power electronics, electric and hybrid propulsion, advanced engineering materials, vehicle systems design, heavy hybrid systems, alternative fuels, and greenhouse gas analysis for public and private concerns. He has been providing technical and program management support for the Advanced Power Electronics and Electric Motor (APEEM) research and development program of the DOE Vehicle Technologies Program for the past 10 years. He develops background data, project summaries, technical and program briefings, achievements and accomplishment reports for the APEEM technology development manager. Mr. Lloyd serves as a consultant on power electronics and electric motor issues for the Electrical and Electronics Industry/Government Technical Team within the USDrive Partnership. The USDrive Partnership is a non-binding and voluntary government-industry partnership focused on advanced automotive and related infrastructure technology research and development. The industry partners in this program are General Motors, Ford Motor Company, Chrysler, and Tesla Motors.

RESPONSE TO INFORMATION SOUGHT

Energetics is a consulting firm with advanced transportation technology and fueling infrastructure expertise that could assist the Québec-Maine EV Task Force in the planning and deployment of an electric vehicle charging corridor between the province of Québec and Southern Maine. We do not provide or install EV charging infrastructure, nor do we endorse any particular manufacturer; however, Energetics has gained unique knowledge and experience with EV charging infrastructure through the inspection and collection of usage data from over 700 public EV charging station installations in New York State as part of our 5-year technical support contract to NYSERDA's EV charging station deployment program. As part of this program, staff has developed numerous publications related to charging infrastructure deployment for NYSERDA through their DOE EV Readiness Grant and the ChargeNY initiative. Some of this effort was in partnership with the Transportation and Climate Initiative, a regional collaboration of 11 Northeast (including Maine) and Mid-Atlantic states and the District of Columbia, which produced valuable EV resources for the entire region and launched the Northeast Electric Vehicle Network. Energetics led the development of EV Charging Station Plans for five regions along the I-90 corridor, and is currently creating an EV Infrastructure Plan for Tompkins County (Ithaca, NY). Energetics also supported a demonstration of EVs in Buffalo Carshare and EV Tourism study for the Lower Hudson Valley, while recently being awarded a large multi-year award from NYSERDA to promote EV use through more charging infrastructure deployments and outreach. Energetics' staff are familiar with the advancements in electric vehicle technology (new models, better battery technologies, increasing available ranges, etc.) through our support of DOE's Vehicle Technologies Program and at a local level are helping to implement marketing strategies at a dealership to increase EV sales. Leveraging relevant project experience and EV technical expertise, Energetics is uniquely qualified to support the Québec-Maine EV Task Force on the ambitious task to install EV charging infrastructure along the proposed corridor.

The questions and topics raised in the RFI by the Québec-Maine EV Task Force are important to understand and answer for the State. Energetics has examined several of these topics in studies from other areas and while there are insights, as well as lessons learned, that can be drawn from elsewhere, the local stakeholders in this project (EV drivers, charging station hosts, utility, municipalities, etc.) will have a significant influence on the suggested strategy for this corridor. The following responses aim to provide some initial insight on this topic, but as described later in our proposed approach, these are best addressed and answered through a study performed by a third-party consultant that draws insight from all key stakeholders.

1) Are the specifications described above sufficient to meet the EV Task Force goals of interoperability, accessibility, and reliability? If not, what changes should be made (e.g., distance between stations, proximity to corridor; choice of DCFC technology)? Should there be minimum requirements in the infrastructure to ensure interoperability?

In order to achieve an EV charging corridor that serves all potential EV drivers, interoperability, accessibility, and reliability are extremely important and should be established at the forefront. It would be extremely inconvenient if an EV driver tried to use the charging corridor and found that a charger was not working or they could not access one, without having enough battery capacity to make it to the next one. Spacing of the DC fast chargers must factor in both current and future EV models, along with weather conditions since cold temperatures will decrease the range of EVs significantly, as Energetics has documented through the EV carshare demonstration in Buffalo. It is probably good to have back-up options (AC level 2 or having twice as many DC fast charger locations in case some are down) as well as some level of guaranteed reliability, but these come at a cost that could potentially prevent the project from getting started. In addition to the stations themselves, reliable electrical service is also needed to keep the charging infrastructure operational. All of these factors should be examined and then specified prior to deployment. Ability for all existing EV models to charge

is important and therefore several charging connector options should be considered and possibly deployed at each location (ideally both CHAdoMO and SAE Combo Charging System).

2) Should the Department seek a vendor to oversee the entire project, including selection and installation of system components, or simply provide cost-share for any company installing electric vehicle charging infrastructure along this corridor? Could there be a combination of both options?

To ensure the vision of the Québec-Maine EV Task Force for this EV charging corridor is carried out, it will likely be necessary to use a vendor that helps oversee the entire project. Providing incentives for installing the infrastructure might result in a patch-work of stations in various portions of the corridor where companies are able to successfully partner with hosts and there is enough expected demand for their business case to be successful. However, the selection of a vendor to oversee the entire project would not require that entity to provide all the services. Putting the entire project out to bid by a single vendor would limit the responses to only those that can handle such a request. Using a consultant to oversee the project, who in turn could bid out the equipment or installations, as well as negotiating with host sites, would likely result in more vendors bidding on those individual elements which could reduce costs. Additionally, a single entity (i.e. technology neutral third party like a consultant) overseeing the whole project would ensure consistency in technology, interoperability (membership and payment), and ensure relevant stakeholder engagement early on to meet local EV driver and potential site host needs.

3) What should the Department and Task Force take into consideration when determining individual sites (e.g., cost, ownership, visibility, accessibility)? Should this initiative try to leverage potential hosts to purchase electric vehicles for use by their organization or others? Should that be a factor in the evaluation between competing host sites?

Based on Energetics' experience of inspecting hundreds of EV charging station installations in New York State, there certainly are certain factors to take into consideration for helping to ensure a successful (well-utilized) station. Energetics has recently drafted a tool to do that under a current project that accounts for value to the host, value to EV drivers that might use the station, and value to supporting the overall goal of increasing EV use. A host that has or is looking to purchase EVs would certainly have the right mindset to being a good host, but several other factors are likely more important for DC fast charger installations along a corridor. Access is certainly important as drivers will want to quickly get off and back on the route for continuing their journey. While DC fast charging is relatively quick, EVs will still be parking there for 20 minutes or even longer if they need to wait for someone to finish charging. Providing amenities for those drivers during that time is important. Available power, lighting, extra parking spaces, and several other factors should also be considered. However, to establish a comprehensive corridor of charging infrastructure, host selection in a more urban area might be more stringent, while in rural areas there may be fewer options, so it will be challenging to have a single set of criteria for the entire corridor. At a micro site level an efficient site design is important to keeping the costs down and interaction or even a partnership with local utility is key as most DCFC stations require installation of a new, dedicated transformer.

4) What should be the minimum/ideal technological specifications, such as DCFC, level 2, or both; number of chargers per station; reliability and speed of technology?

These decisions might depend on how the corridor is designed. Having only DCFC that drivers are relying on will need to have high reliability and perhaps spaced so that drivers can make it to the next one if they see one is not working properly at that time. AC Level 2 stations are nice as a back-up, but they might not be necessarily placed at the same location as the DCFC since those drivers would need to charge significantly longer. The number of charging ports might depend on available electrical capacity and might also be determined over time from usage which should be tracked. Including the capacity to add additional ports in the future is a good

consideration as it can save a lot of time and costs when additional charging ports are needed. As Energetics has done for New York, evaluation of the current EV driver/owner landscape, as well as historic growth over the past 3 years, is a very good starting point in determining the current and projecting the future demand for EV charging stations.

5) What are the pros and cons of the various hardware options and operational/maintenance models and technologies?

There are numerous hardware, as well as software, options for charging station models. The largest trade-off is typically cost, and therefore determining if the added option provides sufficient value to justify the cost. Retractable cords are nice to have in the winter so the cords are not left on the ground where a plow could catch them and rip them off as Energetics has documented in New York. For DCFC, having both the CHAdeMO and SAE Combo Charging System connectors are essential because both options are used by various EV models. For high-profile infrastructure as is being proposed, networking will be valuable to show the drivers which stations are active and when they are in use and also to ensure quick response by stations owners to repair any issues to ensure high reliability of the entire charging network that EV drivers would come to rely on. However, there are many software packages and options that might not be needed for every situation. Some hardware has been more reliable, but most charging station manufacturers have been good about addressing issues that are clearly related to the manufacture of the equipment. Extended warrantees provide an additional sense of security and reliability, but also come at a price that may not be necessary if the host is diligent maintaining the charging stations by keeping them clean and regularly inspected (installing under a covered roof can also help reduce maintenance and the likelihood of issues).

6) What are the various ownership models being used in other locations, and what are the pros and cons of each?

Some charging station manufacturers or network operators maintain ownership of the stations, but that is typically limited to locations where they envision a valuable business case. They are also interested in operating a profitable business, which might result in higher costs for the EV driver (and limit those wanting to use the infrastructure). However, as the operator, they will likely be the most diligent at keeping the station operating properly. Ownership by the site host is the most common and can work well if the host has a vested interest in having the station (for image or to help increase business). This model does not seem to work well if the host is looking to profit from charging station use alone. Energetics has conducted several studies with regard to demand charges associated with DCFC, which can be very costly when utilization is low. Partnering or even ownership by the utility might be an alternative to explore to minimize demand costs if applicable.

7) Are there organizations/municipalities/businesses who would be interested in partnering with the state on this project? What might that partnership look like? Examples include, but are not limited to, additional infrastructure at charging locations; promotion of corridor; ongoing operations and maintenance; private or municipal ownership once completed. The form of local participation may be the subject of a future RFP.

Partnerships with key local stakeholders are likely essential to developing a successful project. Cost share contributions certainly help stretch the public funding, but beyond that, the marketing of the stations and the number of partners willing to voice support of such an effort will go a long way in helping to find additional partners and ultimately having good utilization of this resource once deployed. One of the keys to developing partnerships is establishing a clear vision for the project with input from as many stakeholder as possible early on and keeping them informed throughout the project. Once prospective partners understand the big picture and see it gaining momentum, they will be more ready to engage and contribute to the effort.

8) How have other similar projects successfully promoted the existence and use of the facilities once installed?

Networking the stations with a back office provider or a mobile application for smart phones that EV drivers regularly use will help direct them to the charging infrastructure, but widespread promotion will be needed to start making EV drivers aware of this new opportunity to travel between Québec and Maine. Momentum and publicity should be generated early and often to get this on the news and in publications. Involving a broad audience of key stakeholders right from the start should also help spread the word. Municipalities and key destinations along this route can leverage this resource to promote EV tourism (as Energetics has done under NYSERDA project) and expand charging infrastructure beyond the initial corridor.

9) Should data on the usage of the future charging infrastructure be collected? Are there privacy concerns related to the collection of data?

Data has been collected on charging infrastructure usage in all settings, including DCFC. Energetics has been producing such analysis and reports in collaboration with Idaho National Laboratory for New York State without any concerns. Additionally, INL has collected data from the largest deployment of EV charging stations, both level II and DCFC, nationwide as part of the DOE co-funded EV Project. The value of having usage data is immense. This information can show which stations are being used more, when additional ports might be needed, and will provide trends that help shape future infrastructure investments.

10) Please provide any additional information that may guide optimal design, purchase, installation, operation, maintenance, and ultimate use of the facilities.

Based on our prior experience of understanding EV and EVSE technology, planning for EVSE deployment, evaluating specific sites as potential EVSE hots, verifying EVSE installations, collecting and analyzing EVSE usage data, and making future EVSE recommendations, we recommend the following approach for the proposed project.

PROPOSED APPROACH FOR DEVELOPING THE QUEBEC-MAINE ELECTRIC VEHICLE CHARGING CORRIDOR

1. Roadmap

This first project phase would solidify the vision of the Quebec-Maine Electric Vehicle Charging Corridor by developing the roadmap for implementation. Many of the questions posed by this RFI would be addressed in a lot more detail by combining input from key project stakeholders which would be identified and engaged as part of the proposed approach. This input would be gathered through facilitated workshops, along with other meetings and phone calls to capture the views and opinions of any party potentially involved in this project including potential site hosts, current EV drivers, municipalities along the corridor and local utilities. An approach for deploying charging infrastructure, along with a timeline would be created based on the information collected from the relevant stakeholders. Potential project partners would be engaged to understand their interest and possible contributions which might impact the recommended approach. Initial marketing and branding efforts would be used to start publicizing the upcoming project and new charging infrastructure. The ultimate objective would be to create a vision statement and an implementation plan that will drive the subsequent phases of this project.

2. Procurement

As directed by the project roadmap, the procurement process will select the infrastructure providers and installers. The charging station host locations would be down selected first based on key criteria established by the roadmap (i.e. a tool similar to one Energetics has developed as part of a recent project could be used). If a

large partner with multiple locations in the state was identified during the Roadmap phase, they might be approached first before identifying additional locations that complete the corridor. Station hardware would likely be selected next, potentially with installation services as well (however, the hardware component is much more straightforward for companies to bid on and might result in more significant discounts if bid separately). If not procured along with the equipment, installation services can be bid to local electricians using the primary consultant to oversee and coordinate the work (Energetics has conducted a survey with electrical installers and handled procurements and coordination of installations under previous projects).

3. Installation

Charging station installation would then be conducted as outlined by the roadmap using the vendors selected in the Procurement phase. Oversight would ensure that each charging stations is installed and operating properly, while coordinating similar signage and pavement markings for each site to established a uniform "brand" for these charging stations throughout the corridor. Each installation would be completed with an official opening that builds on the promotional activities conducted throughout all phases of the project.

4. Promotion and Assessment

Once placed in service, the charging stations along the corridor should be monitored for a few years to collect data on usage and continue promoting this resource to current and future EV drivers. Marketing materials would be developed and published online, while events (such as Drive Electric Week) would be facilitated to generate awareness by current and potential future EV drivers. The entire project and results from active use will be used to help promote expansion of the charging infrastructure corridor in the region.